



#16

SEQUENCE LISTING

<110> BOURSAUX-EUDE, CAROLINE
GUISO-MACLOUF, NICOLE

<120> POLYPEPTIDES CONTAINING POLYMORPHISMS OF THE REPEATED
REGIONS OF PERTACTIN IN BORDETELLA PERTUSSIS,
BORDETELLA PARAPERTUSSIS, AND BORDETELLA
BRONCHISEPTICA, THEIR USE IN DIAGNOSTICS, AND IN
IMMUNOGENIC COMPOSITIONS

<130> 03495-0206-00000

<140> 09/855,754

<141> 2001-05-16

<150> 60/206,969

<151> 2000-05-25

<160> 25

<170> PatentIn Ver. 2.1

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<212> DNA

<213> Bordetella bronchiseptica

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<212> DNA

<213> Bordetella pertussis

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Ala Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu
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His Gly Ile His Ile Gln Gly Ser Asp Pro Gly Gly Val Arg Thr Ala
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Ser Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Ile Leu
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 Gly Gly Val Gln Ile Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
 165 170 175
 Ala Ile Val Asp Gly Gly Leu His Ile Gly Ala Leu Gln Ser Leu Gln
 180 185 190
 Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Arg Asp Thr Asn Val
 195 200 205
 Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Ser Val Leu Gly
 210 215 220
 Ala Ser Glu Leu Thr Leu Asp Gly Gly His Ile Thr Gly Gly Arg Ala
 225 230 235 240
 Ala Gly Val Ala Ala Met Gln Gly Ala Val Val His Leu Gln Arg Ala
 245 250 255
 Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
 260 265 270
 Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe
 275 280 285
 Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Ser
 290 295 300
 Val Glu Leu Ala Gln Ser Ile Val Glu Ala Pro Glu Leu Gly Ala Ala
 305 310 315 320
 Ile Arg Val Gly Arg Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu
 325 330 335
 Ser Ala Pro His Gly Asn Val Ile Glu Thr Gly Gly Ala Arg Arg Phe
 340 345 350
 Ala Pro Gln Ala Ala Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala His
 355 360 365
 Ala Gln Gly Lys Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys
 370 375 380
 Leu Thr Leu Thr Gly Gly Ala Asp Ala Gln Gly Asp Ile Val Ala Thr
 385 390 395 400
 Glu Leu Pro Ser Ile Pro Gly Thr Ser Ile Gly Pro Leu Asp Val Ala
 405 410 415
 Leu Ala Ser Gln Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser
 420 425 430

Leu Ser Ile Asp Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val
 435 440 445
 Gly Ala Leu Arg Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro
 450 455 460
 Ala Glu Ala Gly Arg Phe Lys Val Leu Thr Val Asn Thr Leu Ala Gly
 465 470 475 480
 Ser Gly Leu Phe Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp
 485 490 495
 Lys Leu Val Val Met Gln Asp Ala Ser Gly Gln His Arg Leu Trp Val
 500 505 510
 Arg Asn Ser Gly Ser Glu Pro Ala Ser Ala Asn Thr Leu Leu Leu Val
 515 520 525
 Gln Thr Pro Arg Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp
 530 535 540
 Gly Lys Val Asp Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly
 545 550 555 560
 Asn Gly Gln Trp Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys
 565 570 575
 Pro Ala Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln
 580 585 590
 Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
 595 600 605
 Ala Ala Asn Ala Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr
 610 615 620
 Leu Trp Tyr Ala Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu
 625 630 635 640
 Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln
 645 650 655
 Arg Gln Gln Leu Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val
 660 665 670
 Ala Gly Phe Glu Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly
 675 680 685
 Arg Trp His Leu Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly
 690 695 700
 Phe Thr Gly Asp Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly
 705 710 715 720
 Tyr Ala Thr Tyr Ile Ala Asp Ser Gly Phe Tyr Leu Asp Ala Thr Leu
 725 730 735

Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly
 740 745 750
 Tyr Ala Val Lys Gly Lys Tyr Arg Thr His Gly Val Gly Ala Ser Leu
 755 760 765
 Glu Ala Gly Arg Arg Phe Thr His Ala Asp Gly Trp Phe Leu Glu Pro
 770 775 780
 Gln Ala Glu Leu Ala Val Phe Arg Ala Gly Gly Gly Ala Tyr Arg Ala
 785 790 795 800
 Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly
 805 810 815
 Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg
 820 825 830
 Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly
 835 840 845
 Ala Gly Thr Val His Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg
 850 855 860
 Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg
 865 870 875 880
 Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu
 885 890 895
 Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
 900 905 910

<210> 6
 <211> 922
 <212> PRT
 <213> Bordetella parapertussis

<400> 6
 Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
 1 5 10 15
 Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
 20 25 30
 Tyr Ala Asp Trp Asn Asn Gln Ser Ile Ile Lys Ala Gly Glu Arg Gln
 35 40 45
 His Gly Ile His Ile Lys Gln Ser Asp Gly Ala Gly Val Arg Thr Ala
 50 55 60
 Thr Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Val Leu
 65 70 75 80
 Leu Glu Asn Pro Ala Ala Glu Leu Arg Phe Gln Asn Gly Ser Val Thr
 85 90 95

Ser Ser Gly Gln Leu Phe Asp Glu Gly Val Arg Arg Phe Leu Gly Thr
 100 105 110
 Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
 115 120 125
 Asn Val Ser Asp Thr Arg Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
 130 135 140
 Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
 145 150 155 160
 Gly Gly Val Arg Val Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
 165 170 175
 Thr Ile Val Asp Gly Gly Leu His Ile Gly Thr Leu Gln Pro Leu Gln
 180 185 190
 Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Gly Asp Thr Ser Val
 195 200 205
 Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Phe Val Phe Gly
 210 215 220
 Ala Asn Glu Leu Thr Val Asp Gly Gly His Ile Thr Gly Gly Arg Ala
 225 230 235 240
 Ala Gly Val Ala Ala Met Asp Gly Ala Ile Val His Leu Gln Arg Ala
 245 250 255
 Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
 260 265 270
 Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp
 275 280 285
 Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
 290 295 300
 Ser Ile Val Glu Ala Pro Gln Leu Gly Ala Ala Ile Arg Ala Gly Arg
 305 310 315 320
 Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu Ser Ala Pro His Gly
 325 330 335
 Asn Val Ile Glu Thr Gly Gly Gly Ala Arg Arg Phe Pro Pro Pro Ala
 340 345 350
 Ser Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala Arg Ala Gln Gly Arg
 355 360 365
 Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys Leu Thr Leu Ala
 370 375 380
 Gly Gly Ala Gln Gly Gln Gly Asp Ile Val Ala Thr Glu Leu Pro Pro
 385 390 395 400

Ile Pro Gly Ala Ser Ser Gly Pro Leu Asp Val Ala Leu Ala Ser Gln
 405 410 415
 Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser Leu Ser Ile Asp
 420 425 430
 Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val Gly Ala Leu Arg
 435 440 445
 Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro Ala Glu Ala Gly
 450 455 460
 Arg Phe Lys Val Leu Met Val Asp Thr Leu Ala Gly Ser Gly Leu Phe
 465 470 475 480
 Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp Lys Leu Val Val
 485 490 495
 Met Arg Asp Ala Ser Gly Gln His Arg Leu Trp Val Arg Asn Ser Gly
 500 505 510
 Ser Glu Pro Ala Ser Gly Asn Thr Met Leu Leu Val Gln Thr Pro Arg
 515 520 525
 Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp Gly Lys Val Asp
 530 535 540
 Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly Asn Gly Gln Trp
 545 550 555 560
 Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln
 565 570 575
 Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
 580 585 590
 Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro
 595 600 605
 Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala Ala Asn Ala
 610 615 620
 Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr Leu Trp Tyr Ala
 625 630 635 640
 Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu Arg Leu Asn Pro
 645 650 655
 Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln Arg Gln Gln Leu
 660 665 670
 Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val Ala Gly Phe Glu
 675 680 685
 Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly Arg Trp His Leu
 690 695 700

Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly Phe Thr Gly Asp
 705 710 715 720
 Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly Tyr Ala Thr Tyr
 725 730 735
 Ile Ala Asn Ser Gly Phe Tyr Leu Asp Ala Thr Leu Arg Ala Ser Arg
 740 745 750
 Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly Tyr Ala Val Lys
 755 760 765
 Gly Lys Tyr Arg Thr His Gly Val Gly Val Ser Leu Glu Ala Gly Arg
 770 775 780
 Arg Phe Ala His Ala Asp Gly Trp Phe Leu Glu Pro Gln Ala Glu Leu
 785 790 795 800
 Ala Val Phe Arg Val Gly Gly Gly Ala Tyr Arg Ala Ala Asn Gly Leu
 805 810 815
 Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly Arg Leu Gly Leu
 820 825 830
 Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg Gln Val Gln Pro
 835 840 845
 Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly Ala Gly Thr Val
 850 855 860
 Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg Gly Thr Arg Ala
 865 870 875 880
 Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg Gly His Ser Leu
 885 890 895
 Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu Ala Met Pro Trp
 900 905 910
 Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
 915 920

<210> 7
 <211> 51
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 7
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
 20 25 30
 Leu Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp
 35 40 45

Leu Ala Gln
50

<210> 8
<211> 46
<212> PRT
<213> Bordetella bronchiseptica

<400> 8
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp Gly Trp
20 25 30
Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
35 40 45

<210> 9
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 9
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Gly Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Phe Asp Pro Gly Gly Phe Gly Pro
20 25 30
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
35 40 45
Gly Ser Thr Val Glu Leu Ala Gln
50 55

<210> 10
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 10
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
1 5 10 15
Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
20 25 30
Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
35 40 45
Gly Ser Ser Val Glu Leu Ala Gln
50 55

<210> 11
 <211> 61
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 11
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30
 Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr
 35 40 45
 Gly Val Asp Val Ser Gly Ser Ser Val Glu Leu Ala Gln
 50 55 60

<210> 12
 <211> 56
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 12
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30
 Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
 35 40 45
 Gly Ser Ser Val Glu Leu Ala Gln
 50 55

<210> 13
 <211> 51
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 13
 Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1 5 10 15
 Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
 20 25 30
 Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser Val Glu
 35 40 45
 Leu Ala Gln
 50

<210> 14
 <211> 49
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 14
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln
 20 25 30

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
 35 40 45

Ala

<210> 15
 <211> 52
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 15
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
 20 25 30

Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
 35 40 45

Leu Ser Ala Ala
 50

<210> 16
 <211> 59
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 16
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln
 20 25 30

Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Pro Glu Ala Pro Ala Pro
 35 40 45

Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 17
 <211> 52
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 17
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
 20 25 30
 Pro Gln Arg Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
 35 40 45
 Leu Ser Ala Ala
 50

<210> 18
 <211> 56
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 18
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
 20 25 30
 Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro
 35 40 45
 Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 19
 <211> 58
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 19
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
 20 25 30
 Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln
 35 40 45
 Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 50 55

<210> 20
 <211> 48
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 20
 Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro
 20 25 30
 Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 35 40 45

<210> 21
 <211> 52
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 21
 Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
 20 25 30
 Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
 35 40 45
 Leu Ser Ala Ala
 50

<210> 22
 <211> 54
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 22
 Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15
 Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
 20 25 30
 Gln Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly
 35 40 45
 Arg Glu Leu Ser Ala Ala
 50

<210> 23
 <211> 42
 <212> PRT
 <213> Bordetella bronchiseptica

<400> 23

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln
 20 25 30

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
 35 40

<210> 24

<211> 39

<212> PRT

<213> Bordetella bronchiseptica

<400> 24

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1 5 10 15

Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala
 20 25 30

Gly Arg Glu Leu Ser Ala Ala
 35

<210> 25

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

<220>

<221> MOD_RES

<222> (3)..(4)

<223> Phe Asp, Phe Gly or Ala Val

<400> 25

Gly Gly Xaa Xaa Pro
 1 5